

## **Rudolf Virchow**

### **(1821-1902)**

Submitted by L. Maximilian Buja, MD

- Here is a summary from one of my presentations on the remarkable career of Rudolf Ludwig Karl Virchow who had a mind prepared to take advantage of the advances of his day to establish the scientific and diagnostic bases of contemporary pathology.
- Born in 1821, Virchow moved from his native Pomerania to Berlin to become a stellar and energetic student of Johannes Peter Mueller (1801-1858) who was the leading physiologist of his time. From his experience with Mueller, Virchow developed a bent to integrate pathological anatomy with physiology and chemistry.
- Virchow introduced the use of the light microscope for the study of diseased tissues.
- He articulated the seminal biological principle that each cell comes from another cell (“*omnis cellula e cellula*”).
- He advanced the basic thesis that all diseases result from alterations at the cellular level.
- These two fundamental insights continue to stand as the basis of modern biology and medicine.
- Early discoveries:
  - Difference between granulocytes and lymphocytes
  - Leukemia as a distinct disease entity
- He introduced the terms – leukemia, thrombosis, embolism, amyloidosis
- He developed histological criteria of malignant growth.
- He identified the fifth cardinal sign of inflammation: impaired function (*functio laesa*).
- He elucidated the basic pathophysiology of hemostasis and thrombosis (Virchow’s triad).
- In 1847, Virchow co-founded with Benno Reinhardt the *Archiv für pathologische Anatomie und Physiologie und für klinische Medizin* (now known as Virchow’s Archiv).
- He served as the sole editor of some 170 volumes of the Archiv over a span of 50 years.

- In 1848, Virchow proposed political freedom to improve impoverished living conditions associated with a typhus epidemic he was sent to investigate in Upper Silesia, and he advocated other liberal positions making him very unpopular with the Prussian government and resulting in his relocation from Berlin to Würzburg.
- In circa 1850, Virchow wrote a series of articles disproving and denigrating the theories of Karl von Rokitansky (1804-1873), the leader of the Viennese school of gross pathology who championed the theory of humoral pathology and the dyscrasia doctrine. Their rivalry led to an ugly situation that did not accrue to the best natures of either man.
- In 1858, he published *Die Cellularpathologie in ihrer Begründung auf physiologische und pathologische Gewebelehre*. This is the famous exposition of the Cellular Pathology.
- In 1856 Virchow returned to Berlin to become director of the Pathological Institute affiliated with the Charité Hospital.
- Virchow championed the integration of medicine and public health in a democratic society.
- From 1865-1893, he served as a legislator, first in the Prussian lower house (1865-1880) and later in the German Reichstag (1880-1893). He was a leading liberal opponent of the conservative, aristocratic, monarchist Otto von Bismarck, the "Iron Chancellor".
- In 1886, Virchow was the major force in establishment of a system of social security in Germany, including universal health insurance and pensions for the elderly and the disabled.
- In circa 1880, he became a founder of the German Anthropological Society, a prominent member of the Berlin Anthropological Society, and an editor of the ethnological journal, *Zeitschrift für Ethnologie*. He also had a strong related interest in archeology.
- While politically a liberal, Virchow became a *Geheimrat* in medicine. In current usage, the term denotes, somewhat sarcastically, an individual whose authority cannot be challenged. (Original definition was a title that, prior to the year 1918, was bestowed by the Crown on distinguished civil servants and academicians.)
- Virchow held some dubious or wrong positions as follows.
- He expressed the opinion that the skeleton of the Neanderthal man, discovered in 1868, was a modern skeleton who suffered arthritis.
- He attributed all forms of retardation, including the mental ones, to a congenitally narrow aorta.
- In 1882, he publically ridiculed Robert Koch when he announced his discovery of the tubercle bacillus. Later admitted this was wrong.
- He questioned the validity of Emil Von Behring's work on antidiptherial serum. Later admitted this was wrong.

- Virchow established a major educational tradition by mentoring students who developed distinguished careers in pathology and microbiology including Edwin Klebs, Ernst Haeckel, Adolf Kussmaul, Ernst Felix Immanuel Hoppe-Seyler, Friedrich von Recklinghausen, Carl Weigert, Karl Aschoff, Julius F. Cohnheim, and William Henry Welch. Welch returned to the USA to become a leading figure in the advancement of pathology in this country, and he became the first dean of the Johns Hopkins Medical School.
- Rudolph Virchow is justly remembered as the father of modern pathology, a distinguished physician, a noted anthropologist and a great statesman in the liberal or social democratic tradition.

- Bibliography:

Long ER. A History of Pathology. New York: Dover Publications, 1965.

Malkin HM. Out of the Mist: The Foundation of Modern Pathology and Medicine during the Nineteenth Century. Berkley: Versalius Books, 1993.

Safavi-Abbasi S et al. Rudolf Ludwig Karl Virchow: pathologist, physician, anthropologist, and politician. Neurosurg Focus 2006; 20(6):E1-6.

Stenzinger A et al. Would Virchow be a systems biologist? A discourse on the philosophy of science with implications for pathology research. Virchows Arch 2010; 456:599-607.